

Lifetime of persistent homology and minimum spanning acycle in random topology

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Persistent homology theory appeared in the beginning of this century as a tool of Topological Data Analysis for point cloud data, protein data, image data, material sciences, and so on. It describes “birth and death” of homology classes as persistence diagram by providing an increasing sequence of simplicial complexes as input. We are interested in random topology of random object, here in particular, random persistence diagram obtained from random input. The Erdős-Rényi graph process is such a typical example of increasing stochastic process and we can see its random persistence diagram (point process) as an output. In this talk, we mainly focus on simplicial complex versions of the Erdős-Rényi graph process and discuss the mean lifetime of its homology classes by emphasizing the relationship between mean lifetime of persistent homology and minimum spanning acycle.

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